

## WHAT IS CLAIMED IS:

- 1                   1.       An antibody that specifically binds CD22, said anti-CD22 antibody  
2       having a variable light ( $V_L$ ) chain comprising three complementarity determining regions  
3       (CDRs) designated in order from the CDR closest to the amino terminus to the CDR closest  
4       to the carboxyl terminus CDRs 1, 2, and 3, wherein said CDR1 has a sequence selected from  
5       the group consisting of SEQ ID NOs:7, 8, 9, and 10.
- 1                   2.       An anti-CD22 antibody of claim 1, wherein said CDR1 has the  
2       sequence of SEQ ID NO:7.
- 1                   3.       An anti-CD22 antibody of claim 1, further wherein said CDR 2 has the  
2       sequence of SEQ ID NO:11, and said CDR3 has the sequence of SEQ ID NO:12.
- 1                   4.       An anti-CD22 antibody of claim 1, wherein said  $V_L$  chain has the  
2       sequence of SEQ ID NO:20.
- 1                   5.       An antibody of claim 1, further comprising a variable heavy ( $V_H$ ) chain  
2       comprising three complementarity determining regions (CDRs) designated in order from the  
3       CDR closest to the amino terminus to the CDR closest to the carboxyl terminus CDRs 1, 2,  
4       and 3, wherein  
5                   said CDR1 has the sequence of SEQ ID NO:13,  
6                   said CDR 2 has the sequence of SEQ ID NO:15, and  
7                   said CDR3 has a sequence selected from the group consisting of SEQ ID  
8       NOs:15, 16, 17, 18, and 19.
- 1                   6.       An antibody of claim 5, wherein said CDR3 has the sequence of SEQ  
2       ID NO:16.
- 1                   7.       An antibody of claim 5, wherein said  $V_H$  chain has the sequence of  
2       SEQ ID NO:21.
- 1                   8.       An antibody of claim 1, wherein said antibody is selected from the  
2       group consisting of an scFv, a dsFv, a Fab, or a  $F(ab')_2$ .
- 1                   9.       A chimeric molecule comprising  
2       (a) an antibody that specifically binds CD22, said anti-CD22 antibody having

3 a variable light ( $V_L$ ) chain comprising three complementarity determining regions (CDRs)  
4 designated in order from the CDR closest to the amino terminus to the CDR closest to the  
5 carboxyl terminus CDRs 1, 2, and 3, wherein said CDR1 has a sequence selected from the  
6 group consisting of SEQ ID NOs:7, 8, 9, and 10; and

7 (b) a therapeutic moiety or a detectable label.

1 10. A chimeric molecule of claim 9, further wherein said CDR 2 has the  
2 sequence of SEQ ID NO:11, and said CDR3 has the sequence of SEQ ID NO:12.

1 11. A chimeric molecule of claim 9, wherein said antibody further  
2 comprises a variable heavy ( $V_H$ ) chain comprising three complementarity determining  
3 regions (CDRs) designated in order from the CDR closest to the amino terminus to the CDR  
4 closest to the carboxyl terminus CDRs 1, 2, and 3, wherein

5 said CDR1 has the sequence of SEQ ID NO:13,

6 said CDR 2 has the sequence of SEQ ID NO:15, and

7 said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1 12. A chimeric molecule of claim 9, wherein said  $V_L$  chain has the  
2 sequence of SEQ ID NO:20 and said  $V_H$  chain has the sequence of SEQ ID NO:21.

1 13. A chimeric molecule of claim 9, wherein the therapeutic moiety is  
2 selected from the group consisting of a cytotoxin, a drug, a radioisotope, or a liposome loaded  
3 with a drug or a cytotoxin.

1 14. A chimeric molecule of claim 13, wherein the effector moiety is a  
2 cytotoxin.

1 15. A chimeric molecule of claim 14, wherein the cytotoxin is selected  
2 from the group consisting of ricin A, abrin, ribotoxin, ribonuclease, saporin, calicheamycin,  
3 diphtheria toxin, or a cytotoxic fragment or mutant thereof, *Pseudomonas* exotoxin A or a  
4 cytotoxic fragment or mutant thereof ("PE"), and botulinum toxins A through F.

1 16. A chimeric molecule of claim 15, wherein said PE is selected from the  
2 group consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1                   17.     A chimeric molecule of claim 15, wherein said PE has a substituent of  
2     glycine, alanine, valine, leucine, or isoleucine in place of arginine at the position  
3     corresponding to position 490 of SEQ ID NO:24.

1                   18.     A chimeric molecule of claim 17, wherein said substituent at the  
2     position corresponding to position 490 of SEQ ID NO:24 is alanine.

1                   19.     A composition comprising a chimeric molecule of claim 9 and a  
2     pharmaceutically acceptable carrier.

1                   20.     A composition comprising a chimeric molecule of claim 10 and a  
2     pharmaceutically acceptable carrier.

1                   21.     A composition comprising a chimeric molecule of claim 11 and a  
2     pharmaceutically acceptable carrier.

1                   22.     A composition comprising a chimeric molecule of claim 12 and a  
2     pharmaceutically acceptable carrier.

1                   23.     A composition comprising a chimeric molecule of claim 14 and a  
2     pharmaceutically acceptable carrier.

1                   24.     A composition comprising a chimeric molecule of claim 17 and a  
2     pharmaceutically acceptable carrier.

1                   25.     A use of an antibody that specifically binds CD22, said anti-CD22  
2     antibody having a variable light ( $V_L$ ) chain comprising three complementarity determining  
3     regions (CDRs), said CDRs designated in order from the CDR closest to the amino terminus  
4     to the CDR closest to the carboxyl terminus as CDRs 1, 2, and 3, respectively, wherein said  
5     CDR1 has a sequence selected from the group consisting of SEQ ID NOs:7, 8, 9, and 10, for  
6     the manufacture of a medicament to inhibit the growth of a CD22+ cancer cell.

1                   26.     A use of claim 25, further wherein said CDR 2 has the sequence of  
2     SEQ ID NO:11, and said CDR3 has the sequence of SEQ ID NO:12.

1                   27.     A use of claim 25, wherein said antibody further comprises a variable  
2     heavy ( $V_H$ ) chain comprising three complementarity determining regions (CDRs), said CDRs

3 being designated in order from the CDR closest to the amino terminus to the CDR closest to  
4 the carboxyl terminus as CDRs 1, 2, and 3, respectively, wherein  
5 said CDR1 has the sequence of SEQ ID NO:13,  
6 said CDR 2 has the sequence of SEQ ID NO:15, and  
7 said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1 28. A use of claim 25, wherein said V<sub>L</sub> chain has the sequence of SEQ ID  
2 NO:20 and said V<sub>H</sub> chain has the sequence of SEQ ID NO:21.

1 29. A use of claim 25, wherein said antibody is selected from the group  
2 consisting of an scFv, dsFv, a Fab, or a F(ab')<sub>2</sub>.

1 30. A use of claim 29, wherein said antibody is conjugated or fused to a  
2 therapeutic moiety or a detectable label.

1 31 A use of claim 30, wherein the therapeutic moiety is selected from the  
2 group consisting of a cytotoxin, a drug, a radioisotope, or a liposome loaded with a drug or a  
3 cytotoxin.

1 32. A use of claim 31, wherein the therapeutic moiety is a cytotoxin.

1 33. A use of claim 32, wherein the cytotoxin is selected from the group  
2 consisting of ricin A, abrin, ribotoxin, ribonuclease, saporin, calicheamycin, diphtheria toxin  
3 or a cytotoxic fragment or mutant thereof, a *Pseudomonas* exotoxin A or a cytotoxic  
4 fragment or mutant thereof ("PE"), and botulinum toxins A through F.

1 34. A use of claim 33, wherein said PE is selected from the group  
2 consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1 35. A use of claim 33, wherein said PE has a glycine, alanine, valine,  
2 leucine, or isoleucine in place of arginine at the position corresponding to position 490 of  
3 SEQ ID NO:24.

1 36. A use of claim 35, wherein alanine is substituted for arginine at the  
2 position corresponding to position 490 of SEQ ID NO:24.

1                   37.     An isolated nucleic acid encoding a variable light ( $V_L$ ) chain  
2 comprising three complementarity determining regions (CDRs), said CDRs being designated  
3 in order from the CDR closest to the amino terminus to the CDR closest to the carboxyl  
4 terminus as CDRs 1, 2, and 3, respectively, wherein said CDR1 has a sequence selected from  
5 the group consisting of SEQ ID NOs:7, 8, 9, and 10.

1                   38.     A nucleic acid of claim 37, further wherein said CDR 2 has the  
2 sequence of SEQ ID NO:11, and said CDR3 has the sequence of SEQ ID NO:12.

1                   39.     A nucleic acid of claim 37, further encoding a variable heavy ( $V_H$ )  
2 chain comprising three complementarity determining regions (CDRs), said CDRs designated  
3 in order from the CDR closest to the amino terminus to the CDR closest to the carboxyl  
4 terminus CDRs 1, 2, and 3, respectively, wherein  
5                   said CDR1 has the sequence of SEQ ID NO:13,  
6                   said CDR 2 has the sequence of SEQ ID NO:15, and  
7                   said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1                   40.     A nucleic acid of claim 37, wherein said  $V_L$  chain has the sequence of  
2 SEQ ID NO:20 and said  $V_H$  chain of said encoded antibody has the sequence of SEQ ID  
3 NO:21.

1                   41.     A nucleic acid of claim 37, wherein said nucleic acid encodes an  
2 antibody selected from the group consisting of an scFv, a dsFv, a Fab, or a  $F(ab')_2$ .

1                   42.     A nucleic acid of claim 37, further wherein said nucleic acid encodes a  
2 polypeptide which is a therapeutic moiety or a detectable label.

1                   43.     A nucleic acid of claim 42, further wherein said therapeutic moiety is a  
2 drug or a cytotoxin.

1                   44.     A nucleic acid of claim 43, further wherein said cytotoxin is  
2 *Pseudomonas* exotoxin A or a cytotoxic fragment or mutant thereof ("PE").

1                   45.     A nucleic acid of claim 44, wherein said PE is selected from the group  
2 consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1                   46.     A nucleic acid of claim 44, wherein said PE has a glycine, alanine,  
2 valine, leucine, or isoleucine in place of arginine at the position corresponding to position 490  
3 of SEQ ID NO:24.

1                   47.     A nucleic acid of claim 44, wherein alanine is substituted for arginine  
2 at the position corresponding to position 490 of SEQ ID NO:24.

1                   48.     An expression vector comprising a nucleic acid of claim 37 operably  
2 linked to a promoter.

1                   49     An expression vector comprising a nucleic acid of claim 38, operably  
2 linked to a promoter.

1                   50.     An expression vector comprising a nucleic acid of claim 39 operably  
2 linked to a promoter.

1                   51.     An expression vector comprising a nucleic acid of claim 40, operably  
2 linked to a promoter.

1                   52.     An expression vector comprising a nucleic acid of claim 44 operably  
2 linked to a promoter.

1                   52.     An expression vector comprising a nucleic acid of claim 46 operably  
2 linked to a promoter.

1                   53.     A method of inhibiting growth of a CD22+ cancer cell by contacting  
2 said cell with a chimeric molecule comprising (a) an antibody that binds to CD22, said  
3 antibody having a variable light ( $V_L$ ) chain comprising three complementarity determining  
4 regions (CDRs), said CDRs designated in order from the CDR closest to the amino terminus  
5 to the CDR closest to the carboxyl terminus CDRs 1, 2, and 3, respectively, wherein said  
6 CDR1 has a sequence selected from the group consisting of SEQ ID NOs:7, 8, 9, and 10, and  
7 (b) a therapeutic moiety,  
8 wherein said therapeutic moiety inhibits the growth of said cell.

1                   54.     A method of claim 53, further wherein said CDR 2 of said  $V_L$  has the  
2 sequence of SEQ ID NO:11, and said CDR3 of said  $V_L$  has the sequence of SEQ ID NO:12.

1           55.     A method of claim 53, wherein said antibody comprises a V<sub>H</sub> chain  
2 comprising three complementarity determining regions (CDRs), said CDRs designated in  
3 order from the CDR closest to the amino terminus to the CDR closest to the carboxyl  
4 terminus CDRs 1, 2, and 3, respectively, wherein  
5                 said CDR1 has the sequence of SEQ ID NO:13,  
6                 said CDR 2 has the sequence of SEQ ID NO:15, and  
7                 said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1           56.     A method of claim 55, wherein said V<sub>L</sub> chain has the sequence of SEQ  
2 ID NO:20 and said V<sub>H</sub> chain has the sequence of SEQ ID NO:21.

1           57.     A method of claim 53, wherein said antibody is selected from the  
2 group consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1           58.     A method of claim 53, wherein said therapeutic moiety is selected  
2 from the group consisting of a cytotoxin, a drug, a radioisotope, or a liposome loaded with a  
3 drug or a cytotoxin.

1           59.     A method of claim 53, wherein the therapeutic moiety is a cytotoxin.

1           60.     A method of claim 59, wherein the cytotoxin is selected from the  
2 group consisting of ricin A, abrin, ribotoxin, ribonuclease, saporin, calicheamycin, diphtheria  
3 toxin or a cytotoxic fragment or mutant thereof, *Pseudomonas* exotoxin A or a cytotoxic  
4 fragment or mutant thereof ("PE"), and botulinum toxins A through F.

1           61.     A method of claim 60, wherein said PE is selected from the group  
2 consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1           62.     A method of claim 60, wherein said PE has a glycine, alanine, valine,  
2 leucine, or isoleucine in place of arginine at the position corresponding to position 490 of  
3 SEQ ID NO:24.

1           63.     A method of claim 62, wherein alanine is substituted for arginine at the  
2 position corresponding to position 490 of SEQ ID NO:24.

1                   64     A method for detecting the presence of a CD22+ cancer cell in a  
2 biological sample, said method comprising:

3                   (a)     contacting cells of said biological sample with a chimeric molecule  
4 comprising

5                             (i) an antibody that specifically binds to CD22, said antibody having a  
6 variable light (V<sub>L</sub>) chain comprising three complementarity determining regions (CDRs), said  
7 CDRs designated in order from the CDR closest to the amino terminus to the CDR closest to  
8 the carboxyl terminus CDRs 1, 2, and 3, respectively, wherein said CDR1 has a sequence  
9 selected from the group consisting of SEQ ID NOs:7, 8, 9, and 10, conjugated or fused to

10                           (ii) a detectable label; and,

11                   (b)     detecting the presence or absence of said label,  
12 wherein detecting the presence of said label indicates the presence of a CD22+ cancer cell in  
13 said sample.

1                   65.     A method of claim 64, further wherein said CDR 2 of said V<sub>L</sub> of said  
2 antibody has the sequence of SEQ ID NO:11, and said CDR3 of said V<sub>L</sub> of said antibody has  
3 the sequence of SEQ ID NO:12.

4  
1                   66.     A method of claim 64, wherein said antibody further comprises a  
2 variable heavy (V<sub>H</sub>) chain comprising three complementarity determining regions (CDRs),  
3 said CDRs designated in order from the CDR closest to the amino terminus to the CDR  
4 closest to the carboxyl terminus CDRs 1, 2, and 3, respectively, wherein  
5                   said CDR1 has the sequence of SEQ ID NO:13,  
6                   said CDR 2 has the sequence of SEQ ID NO:15, and  
7                   said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1                   67.     A method of claim 64, wherein said V<sub>L</sub> chain has the sequence of SEQ  
2 ID NO:20 and said V<sub>H</sub> chain has the sequence of SEQ ID NO:21.

1                   68.     A method of claim 64, wherein said antibody is selected from the  
2 group consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1                   69.     A kit comprising:

2                   (a)     a container, and



3 (b) a chimeric molecule comprising

4 (i) an anti-CD22 antibody having a variable light (V<sub>L</sub>) chain

5 comprising three complementarity determining regions (CDRs), said CDRs designated in  
6 order from the CDR closest to the amino terminus to the CDR closest to the carboxyl  
7 terminus CDRs 1, 2, and 3, respectively, wherein said CDR1 has a sequence selected from  
8 the group consisting of SEQ ID NOs:7, 8, 9, and 10, conjugated or fused to

9 (ii) a detectable label or a therapeutic moiety.

1 70. A kit of claim 69, further wherein said CDR 2 of said V<sub>L</sub> of said  
2 antibody has the sequence of SEQ ID NO:11, and said CDR3 of said V<sub>L</sub> of said antibody has  
3 the sequence of SEQ ID NO:12.

1 71. A kit of claim 69, wherein said antibody further comprises a variable  
2 heavy (V<sub>H</sub>) chain comprising three complementarity determining regions (CDRs) designated  
3 in order from the CDR closest to the amino terminus to the CDR closest to the carboxyl  
4 terminus CDRs 1, 2, and 3, wherein

5 said CDR1 has the sequence of SEQ ID NO:13,

6 said CDR 2 has the sequence of SEQ ID NO:15, and

7 said CDR3 has a sequence selected from the group consisting of SEQ ID  
8 NOs:15, 16, 17, 18, and 19.

1 72. A kit of claim 71, wherein said V<sub>L</sub> chain has the sequence of SEQ ID  
2 NO:20 and said V<sub>H</sub> chain has the sequence of SEQ ID NO:21.

1 73. A kit of claim 69, wherein said antibody is selected from the group  
2 consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1 74. A kit of claim 69, wherein said therapeutic moiety is selected from the  
2 group consisting of a cytotoxin, a drug, a radioisotope, or a liposome loaded with a drug or a  
3 cytotoxin.

1 75. A *Pseudomonas* exotoxin A or a cytotoxic fragment or mutant thereof,  
2 wherein said PE has a glycine, alanine, valine, leucine, or isoleucine in place of arginine at  
3 the position corresponding to position 490 of SEQ ID NO:24.

1                   76.     A PE of claim 75, selected from the group consisting of PE35, PE38,  
2     PE38KDEL, PE40, PE4E, and PE38QQR.

1                   77.     A PE of claim 75, having an alanine at a position corresponding to  
2     position 490 of SEQ ID NO:24.

1                   78.     A chimeric molecule comprising a targeting moiety conjugated or  
2     fused to a *Pseudomonas* exotoxin A or a cytotoxic fragment or mutant thereof ("PE"),  
3     wherein said PE has a glycine, alanine, valine, leucine, or isoleucine in place of arginine at a  
4     position corresponding to position 490 of SEQ ID NO:24.

1                   79.     A chimeric molecule of claim 78 wherein said PE is selected from the  
2     group consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1                   80.     A chimeric molecule of claim 78 wherein said PE has an alanine at a  
2     position corresponding to position 490 of SEQ ID NO:24.

1                   81.     A chimeric molecule of claim 78 wherein said targeting moiety is an  
2     antibody.

1                   82.     A chimeric molecule of claim 81, wherein said antibody is selected  
2     from the group consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1                   83.     A composition comprising a chimeric molecule of claim 78 and a  
2     pharmaceutically acceptable carrier.

1                   84.     A composition comprising a chimeric molecule of claim 79 and a  
2     pharmaceutically acceptable carrier.

1                   85.     An isolated nucleic acid encoding *Pseudomonas* exotoxin A or  
2     cytotoxic fragment or mutant thereof ("PE"), wherein said PE has a glycine, alanine, valine,  
3     leucine, or isoleucine in place of arginine at a position corresponding to position 490 of SEQ  
4     ID NO:24.

1                   86.     An isolated nucleic acid of claim 85 wherein said PE is selected from  
2     the group consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1                   87.     An isolated nucleic acid of claim 85 wherein said PE has an alanine at  
2     the position corresponding to position 490 of SEQ ID NO:24.

1                   88.     An isolated nucleic acid of claim 85 wherein said nucleic acid further  
2     encodes a targeting moiety.

1                   89.     An isolated nucleic acid of claim 88 wherein said targeting moiety is  
2     an antibody.

1                   90.     An isolated nucleic acid of claim 89, wherein said antibody is selected  
2     from the group consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1                   91.     An expression vector comprising a nucleic acid of claim 85 operably  
2     linked to a promoter.

1                   92     An expression vector comprising a nucleic acid of claim 86, operably  
2     linked to a promoter.

1                   93.     An expression vector comprising a nucleic acid of claim 87 operably  
2     linked to a promoter.

1                   94.     An expression vector comprising a nucleic acid of claim 88, operably  
2     linked to a promoter.

1                   95.     A use of a targeting moiety conjugated or fused to *Pseudomonas*  
2     exotoxin A or a cytotoxic fragment or a mutant thereof ("PE"), wherein said PE has a glycine,  
3     alanine, valine, leucine, or isoleucine in place of arginine at a position corresponding to  
4     position 490 of SEQ ID NO:24, for the manufacture of a medicament to inhibit the growth of  
5     cells targeted by said targeting moiety.

1                   96.     A use of claim 95, wherein said PE is selected from the group  
2     consisting of PE35, PE38, PE38KDEL, PE40, PE4E, and PE38QQR.

1                   97.     A use of claim 95 wherein said PE has an alanine at the position  
2     corresponding to position 490 of SEQ ID NO:24.

1                   98.     A use of claim 95 wherein said targeting moiety is an antibody.

1                    99.    A use of claim 98, wherein said antibody is selected from the group  
2 consisting of an scFv, a dsFv, a Fab, or a F(ab')<sub>2</sub>.

1                    100.   A method of inhibiting the growth of a cell bearing a target molecule,  
2 said method comprising contacting said cell with a chimeric molecule comprising  
3                    (a) a targeting moiety that binds to said target molecule, and  
4                    (b) *Pseudomonas* exotoxin A or a cytotoxic fragment or mutant thereof  
5 ("PE"), wherein said PE has a glycine, alanine, valine, leucine, or isoleucine in place of  
6 arginine at a position corresponding to position 490 of SEQ ID NO:24, wherein contacting  
7 said cell with said chimeric molecule inhibits the growth of said cell.

1                    101.   A method of claim 100, wherein said target molecule is a cytokine  
2 receptor and said targeting moiety is a cytokine which binds to said receptor.

1                    102.   A method of claim 100, wherein said target molecule is an antigen and  
2 said targeting molecule is an antibody which binds to said antigen.

1                    103.   A method of claim 102, wherein said antigen is a tumor associated  
2 antigen.

1                    104.   A method of claim 100, wherein said wherein said PE has an alanine in  
2 place of arginine at a position corresponding to position 490 of SEQ ID NO:24.

1                    105.   A method of claim 100, wherein the target molecule is the IL-13  
2 receptor and the targeting molecule is IL-13, a mutated IL-13 that retains the ability to bind  
3 the IL-13 receptor, a circularly permuted IL-13, or an antibody that specifically binds a chain  
4 of the IL-13 receptor but which does not also bind the IL-4 receptor.